AN ANALYSIS OF CASES OF ACTIVE ECLAMPSIA IN THE ROYAL MATERNITY HOSPITAL, EDINBURGH, 1890 - 1919, AND A REVIEW OF TREATMENT.

Thesis for the Degree of M.D.

by

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During a term of duty as house-surgeon in the Royal Maternity Hospital, Edinburgh, my interest was very specially aroused in the treatment of a series of eclamptic patients, and having through the permission of the authorities, access to the previous records of the hospital, I was tempted to make a study of this vexed question.

With opinions so bewilderingly divergent, the young practitioner is quite at a loss to know what course to adopt until he has carefully considered the opinions of the many authorities who have made this subject a special study, and drawn his own conclusions.

In this disease, which varies so remarkably in type and individual prognosis, one is inclined, perhaps more than in any other, to form an erroneous opinion from the study of a small series of cases.

The variations in the severity of the disease in different years and under different weather conditions is universally recognised so that comparison of cases occurring over short periods and in small series is unreliable.

It has been considered, however, that ten-year periods are sufficiently long to give a fair average of /

of severe and mild cases, and to afford a fair basis for comparison.

As a striking illustration of this variation, in the decade 1910-1919 where the total mortality in 234 cases was 24.36%, a series of 69 consecutive cases in a period of 3¼ years occurred with only 5 deaths, a percentage of 7.2 (March 1913 - June 1916)

As, in the particular series of cases with which my study commenced, an expectant method of treatment had proved highly successful, one was not unnaturally impressed.

An endeavour has however been made to review the literature with an open mind.

A study of all the cases which have occurred in the Maternity Hospital in the last three decades 1890-99, 1900-09, and 1910-19, was first made with special reference to treatment and result.

Unfortunately the detailed records of a number of the cases are not to be found (though the actual case list is complete).

The statistics therefore lose some of their value. Moreover, as the charge of the hospital has passed at frequent intervals to different physicians holding different views, a single method of treatment has not been carried out in any long consecutive series of cases.

Notwithstanding this an analysis of the cases is not/

not without value, and some conclusions on general lines can be made therefrom.

No attempt has been made to prove any particular theory or the success of any particular detail of treatment from these cases alone - they have simply been made the basis for the study.

The literature regarding the various methods and details of treatment has then been examined, some of the numerous statistics are compared, and finally in the light of all this varied experience an attempt has been made to form conclusions.

The consideration is confined to the treatment of active eclampsia; i.e. where convulsions have actually occurred; - of the pre-eminent importance of prophylactic measures there are no two opinions, and the general lines on which this should be conducted are universally accepted.

I. A CONSIDERATION OF THE "MEDICAL" MEASURES ADVISED.

In the absence of any definite knowledge of the etiology of eclampsia there is general agreement in considering the disease a toxaemia; the toxin, from whatever source it is derived, circulating in the body, accumulating through defective elimination, and manifesting itself most obviously by its action on the nerve centres.

The two main lines of medical treatment are therefore directed:-

(a) To the elimination or dilution of the toxin

(b) To sedation of the nervous system.

And under the belief that the high blood-pressure, which is so common a symptom, is in itself a direct agent in causing or maintaining the convulsions, some authorities place great importance in

(c) Reduction of the blood-pressure.

A. Methods directed to elimination or dilution of the toxin.

1. Purgation.

Regarding the usefulness of this there is general agreement. It is effective in aiding the elimination of the poison and if free evacuations are produced it is also helpful in reducing oedema if present.

The form is immaterial provided that the dose is an efficient one. Perhaps magnesium sulphate 2 - 4 ounces in concentrated solution given by the stomach tube is as useful as any. Croton oil is theoretically very suitable, but it is the experience of many that in this condition it often proves ineffective.

Enemas should at the same time be administered to clear the lower bowel.

Tweedy at the Rotunda Hospital (holding as he does special views as to the food origin of the toxin) and others emphasise the value of copious lavage of the lower bowel by means of successive pints of fluid through a long rectal tube, until the return in clear.

Lavage of the Stomach, too, is very generally adopted. It is to be recommended for several reasons.

(1) It eliminates any accumulation of irritant food material in the stomach.

(2) In the belief that the toxin may be eliminated, like other poisons by the mucous membrane of the stomach, lavage is considered to be useful in removing the actual toxin.

(3) It has been suggested that the warm solution acting as an "internal poultice" causes dilatation of the abdominal vessels with consequent lowering of the pressure in the peripheral circulation.

A warning of Tweedy's in connection with this procedure should be considered. He points out the danger of fluid entering the larynx with the patient in a comatose state and the necessity for skill even in the seemingly simple matter of passing a tube.

I am inclined to think that lavage of the stomach adds to the danger of oedema if great care is not exercised.

It is however a most useful procedure.

Venesection.

First advocated by Ramsbotham (in Obstetrical Medicine and Surgery 1844) it after a time fell into disfavour.

He recommended profuse venesection 40 - 50 ounces.

Recently venesection, more moderately performed, has again been widely recommended.

It is considered to remove the toxin in considerable quantity and to lower the blood pressure.

Lichtenstein [1] advocated this method strongly and in 1913 reported that the last 94 cases were treated in Zweifel's clinique in Leipsic with this as the chief agent, with 5 deaths.

Williams/

Williams[2] says "my experience indicates that the best results are obtained when free venesection preceeds all other forms of treatment. Accordingly it is my practice to withdraw 600-1000 cc. of blood as soon as possible after the first convulsion irrespective of the condition of the pulse. It is generally stated that bleeding is indicated only when the pulse is full and bounding. Personally I have bled with most excellent results many patients whose pulse was thin and weak, and it is frequently in this type of case that the beneficial effects are most apparent".

Jardine[3] supports venesection in the fullblooded and has even used it in cases without great tension, with good results.

Hirst[4] is of opinion that it should be adopted in fullblooded persons and early, not waiting for signs of oedema of the lungs.

Petersen[5] (Moran) advises its use only in plethoric patients and in moderate amounts. (300 cc.)

Midwifery (by Ten Teachers)[6] thinks it is a useful measure in plethoric or cyanosed patients.

Edgar[7] however is not so decidedly in favour. "It is a measure of doubtful utility."

Tweedy/

Tweedy & Wrench[8], and the Dublin School, maintain that "it is an unproved assumption that the toxins in the system are contained in the blood stream.
Like the toxin of tetanus they may travel through paths other than the circulation. Bleeding depresses the heart and as the majority of our fatal cases died from heart failure we do not bleed."

De Lee[9]. Would restrict venesection to sthenic cases and only use it after delivery. He thinks that if used before delivery it might render the patient's condition in the event of operation, less satisfactory.

In articles on treatment in recent journals the following views have been expressed.-

Little. stated that he was a firm believer in venesection in full quantities.

Ballantyne[10] depends on venesection along with other eliminative and diluent measures.

Gibbons[11] recommends venesection to the amount of 500 - 600 cc., or until the patient turns pale or the pulse is affected.

Stroganoff/

Stroganoff[12] uses venesection in his system of treatment only when there is oedema of the lungs.

Winter[13]) however (as well as Lichtenstein) use
Werner[14]) Stroganoff's system combined with venesection.

Cragin & Hull[15] and Haultain[16] and other believers in veratrone believe the use of this drug to be more effective than venesection, and so have superseded it.

Purslow[17], Knipe & Connolly[18]; and Strachan[19], have spoken of it with favour.

Smith[20] thinks it may bring about a condition akin to shock, and place the patient in a bad condition to undergo surgical measures.

One may conclude from the experience of the majority of these observers that this method of treatment is a measure of great service.

That in moderate amounts, 15 - 20 ounces in plethoric or cyanosed patients, and even in many other cases, provided that the pulse is not weak and the patient so collapsed as to obviously contraindicate it, venesection should be employed.

If delivery is immanent when the patient is first seen/

seen it would seem wiser to await the result of post-partum haemorrhage, and to encourage it. Venesection would then only be necessary if bleeding during the third stage was not considered sufficient.

Diaphoresis.

Of eliminative methods this has perhaps caused most dispute.

The underlying principle is elimination by the skin.

That this occurs is, however, actively opposed by some, who maintain that toxins are not eliminated by sweating, and that the treatment leads only to the concentration of the body fluids, a state of affairs directly opposite to that which one should aim at attaining.

They also point out the depressing effect of sweating.

But the advocates of diaphoretic measures also hold that the simultaneous exhibition of large quantities of fluid prevents any such ill-effects.

It seems to me strange that it should be so strongly opposed when in the very similar condition of nephritis the clinical results have been so satisfactory.

Burney Yeo[21] in discussing diaphoresis in uraemia states.- "It has been said that to excite profuse perspiration in these uraemic attacks must be injurious by causing a concentration of the blood unless we can at the same time ensure free absorption of water by the stomach or by the injection of warm water into the rectum.

The best answer however to this objection is the frequently observed fact that patients come out of the uraemic state when, under the influence of pilocarpine and the wet pack, free action of the skin has been established.

Much depends on the ability of the skin to take upon itself the eliminating functions of the kidney which on experimental, not clinical, grounds has been doubted.

If it should only allow of aqueous transpiration then excessive perspiration might lead to dangerous concentration of toxic substances in the blood, but when it is capable of freely eliminating the solid and toxic constituents of the urine, and we know this to be the case, then its excessive action must be beneficial as in the great majority of cases it is practically found to be."

Two measures are however condemned almost universally.-

Pilocarpine, once used freely, is now held by all to be too dangerous a drug. It increases salivation and the tendency to oedema of the lungs and is depressant.

The Hot bath is considered by the majority to entail too much manipulation.

The methods most in favour are the Hot air bath, the hot pack, or less profuse sweating by means of hot bottles, blankets and waterproof sheets.

Hirst[4], Edgar[7] and Williams[2] all speak in favour of diaphoresis by means of hot air bath or the hot pack.

De Lee[9] is against active diaphoretic measures, but favours its moderate use.

Jardine[3] is in favour of the hot pack and represents the Glasgow belief.

Ballantyne[10] believes in diaphoresis and the majority of Edinburgh obstetricians have held the same view.

Midwifery (by Ten Teachers)[6] representing a general summary of the views of Ten London teachers advises against diaphoresis unless to reduce temperature and then only with plenty of fluid.

Gibbons/

Gibbons[11] in considering the subject states that Doderlein in his "Clinical Lectures" and Leopold advise against.

His own opinion is that "it is theoretically unsound but if saline solution be freely flowing into the intestine, rectum or vein then dilution of the toxin is taking place and no harm can come of it."

Tweedy[8] Diaphoresis is to be avoided. It reduces the fluidity of the blood and only a minimum of toxins (if any) can be eliminated. Smyly and Byers and others of the Irish school agree with this teaching.

Little[22] strongly advocates hot air baths, having had good results with its use.

Knipe and Connolly[18] use the hot air cabinet.

The conclusion is that the objections are mostly theoretical, and that used as advised, along with the exhibition of fluids, it is likely to be helpful and certainly devoid of harm.

Diuresis.

The kidney function is in the majority of cases greatly at fault, and all realise the good which results when free urinary excretion is established.

But/

But to promote diuresis is the difficulty.

In active eclampsia diuretics cannot be exhibited by the mouth in the majority of cases, and their action is slow.

As a substitute infusion of fluids by various channels has been widely recommended.

Jardine[3] has been a special advocate of saline treatment, giving 1½ - 2 pints into the loose cellular tissue or intravenously if a venesection has been performed, or per rectum.

At one time he added sodium acetate 1 drachm to the pint of normal saline as a diuretic.

He is firmly convinced of the diuretic power of these infusions and places this measure first in importance in his treatment.

He is supported by others of the Glasgow school and Ballantyne also believes in salines.

On theoretical grounds it has been maintained that salt solution might cause retention.

This is only likely to occur if the solution is hypertonic.

Tweedy on this account substitutes a sod. bicarb. solution - 1-2 drachms to the pint.

Williams[2] however says this theoretical objection does not accord with his clinical observations and he favours salines.

He/

He quotes Zweifel of Leipsic as advocating the addition of sodium bicarbonate to the saline on the view that the eclamptic poison is acid in nature (as in diabetes).

The utility of salines is almost generally agreed to. There is however some disagreement as to the best channel of administration.

At one time fluid was frequently left in the stomach after lavage but this is open to several objections; that it is very frequently vomited and that in a comatose patient regurgitation of fluid adds to the risk of oedema of the lungs.

Intravenously. This has been objected to by Haultain and others on the ground that it raises the blood-pressure.

Subcutaneously. This has been objected to because abscess has been caused especially with alkaline fluids.

Cushny in his Therapeutics states alkaline fluids should not be injected hypodermically as sloughing has been observed repeatedly from this procedure.

Jardine however states that in many hundreds of cases with salines he has only once seen an abscess.

Rectal/

Rectal salines are however free from all these objections.

Oedema of the lungs is generally agreed to be a contra-indication to saline administration and most writers advise against it if there is marked general oedema, and where the tissues are already waterlogged.

On the whole, therefore, infusions are to be strongly recommended with the above exceptions, probably per rectum for preference. The fluid seems to matter little - a sodium bicarbonate solution perhaps avoids theoretical objections and is the most satisfactory.

The advocates of veratrone, while emphasising especially the circulatory depressant action, claim for it powerful diuretic properties.

Those who believe in thyroid also consider that one of its good effects is due to increased urinary secretion which undoubtedly occurs in some persons.

B. Sedation of the Nervous System.

The use of Chloroform.

When first introduced $CHCl_3$ was freely used in eclampsia so that the patient was kept more or less continuously under the influence of the drug.

There is no question that this was bad treatment.

Its use was then limited to the actual control of the fits or to when operative measures or such procedures as lavage, venesection or examination were being carried out.

Others who believe in its moderate use say that it should not be given to control the actual fits - that in this stage oxygen is more necessary.

In the obstetrical works of Edgar (1903) Hirst (1900) Petersen (1907) Jardine (1910) chloroform is advocated.

Recently, however, investigations into the destructive action of chloroform on the liver, causing lesions very similar to that of the eclamptic poison - have led to the rejection of chloroform by many. Cragin and Hull. discuss the question fully and compare the effects of ether and chloroform experimentally on animals.

They maintain that ether has not the same ill effects and advise strongly against chloroform.

Williams, De Lee and Tweedy and Wrench are against its use. De Lee even avoids ether if possible, and for abdominal Cesarean section would use Nitrous Oxide and Oxygen anaesthesia.

Stroganoff and his followers use chloroform in very moderate amounts while the active portion of their treatment is being carried out.

Midwifery (Ten Teachers) considers that it is still useful if used with care.

Strachan deprecating its continued use considers that as an adjuvant to operative treatment it is unequalled.

Purslow would use it for operative purposes.

Over ether it has the advantage of quick action and a much less tendency to cause profuse secretion.

One cannot but conclude that the bulk of opinion is against chloroform and that it is perhaps wiser to use ether, but I feel that the danger of chloroform poisoning has been over-emphasised of late, and that the fear of it is due in many cases to faulty administration.

Chloral.

Usually used in combination with potassium bromide. At one time it was highly thought of, especially on the continent.
Winckel was perhaps its greatest advocate.

Stroganoff combines its use with Morphia, believing that the value of each is enhanced by the other.

Jardine prefers chloral to morphia, as also does Haultain.
At the present time it is generally considered to be more effective in controlling restlessness than actual convulsions. - Strachan.
It is also actively opposed by some as a cardiac depressant.- Smith. Tweedy and Wrench.

It would appear to be a drug whose advantages are not great enough to outweigh its disadvantages and one which could be omitted without loss to treatment.

Morphia.

In the opinion of a very large number of observers morphia is the most satisfactory sedative which we possess for controlling eclamptic convulsions.

That/

That it acts successfully in this manner is beyond all doubt.

Its hypodermic administration is a great advantage for rapid action. And it has no depressing action on the heart like other sedatives suggested.

It tends to lower blood-pressure and the fact that it retards protein metabolism is regarded by those who advise its use, as an advantage and not a disadvantage, as others state.

It is opposed by some on the theoretical objection that it lessens elimination by the kidney, but some think that in eclampsia this result is not seen and that rather by reducing congestion in the kidneys it even aids diuresis.

By others it is opposed on account of danger to the child - a statement difficult to prove.

And some maintain that it prolongs the post-partum coma.

Veit brought its use into prominence in 1896 by reporting very successful results.

Tweedy and others of the Irish school, and Stroganoff and his followers use morphia as an important item in their systems of treatment.

Lichtenstein, Winter and Werner follow Stroganoff though using venesection in addition.

Smily/

Smily, Jellett and Byers have spoken in favour of the Rotunda System.

Eden [23] speaks highly in favour of morphia.

Johnstone[24] considers it the best sedative.

Galabin [25] recommends it.

Midwifery (by Ten Teachers) is in favour of morphia unless the case presents anuria.

Moran in Petersen's Obstetrics places sedatives in this order.- Morphia, chloral, veratrum, viride.

Edgar - while stating in his Obstetrics that "he had given up morphia since it seemed to prolong post-eclamptic stupor while increasing the tendency to death during coma by its interference with the eliminative processes" has revised his opinion and now says that he has come to consider morphia the most valuable agent.

Hirst and Williams while referring to Veit and Stroganoff's results, expresses no definite opinion.

In articles on treatment.-

Strachan, Sharp[26], Knipe and Connolly, and McPherson[27] speak strongly in favour of morphia.

Rouvier[28] of Paris supports morphia in large doses and thinks it reduces the congestion of the kidneys.

Smith - thinks morphia cannot be too highly recommended. He thinks that in eclampsia morphia even promotes diuresis.

Opposed to these opinions:-

De Lee thinks morphia kills many babies and prolongs post-partum coma.

Gibbons advises against it on account of the child.

Jardine has abandoned morphia as lessening urinary secretion and thus counteracting the salines.

Haultain advises against morphia.

Zinke[29] advises against.

Brodhead[30] says that morphia has never appealed to him.

C. Measures directed to reduction of Blood-Pressure.

Veratrone.

The use of veratrum viride has for long been advocated by many in eclampsia to lower the blood-pressure, slow the pulse, and thus indirectly calm the nervous system.

Especially in America has it had a wide popularity.

For a considerable time the preparations available were fluid extracts or tinctures of veratrum viride.

In the majority of cases the oral administration was impossible, and hypodermically it gave rise to untoward symptoms.

Moreover the preparations were uncertain in their composition and strength. For these reasons the drug never attained any wide popularity in this country.

More recently however, with the introduction of preparations of active principles, standardised in strength and suitable for hypodermic injection, attention to this drug has been revived.

In more recent literature the writings of Mangiagalli (Italy), Cragen and Hull and Zinke in America and Haultain in this country, have been specially prominent in the praise of this drug.

Mangiagalli, relating his own experience in 100 cases over a period of 10 years (1897 - 1907) begins/

begins by stating that he believes in early delivery and considers the convulsions as but an incident in the disease.

Yet they are one of the most dangerous incidents representing the gravity of the disease and in themselves dangerous.

He states therefore "in my practice for the last 10 years my conduct has been guided by this idea - to lessen the frequency and intensity of the convulsions or to suppress them by means of veratrum viride while waiting for the favourable conditions which will permit of delivery of the woman."

He is convinced by comparison of those results with his own for the previous 25 years that there is no better method of doing this than veratrum viride.

He agrees that the drug must be very carefully administered under the personal supervision of a medical man.

He believes in small doses, frequently repeated if necessary, and is guided in this by the pulse rate which he tries to keep below 80, and the Blood pressure, which he tries to keep below 150 mm. He would not give it if the pulse was weak and rapid or the Blood Pressure not high.

Veratrum is not claimed by him to have any effect as an antidote to the poison, and he states that if the pregnancy continues, evidence of auto-intoxication are/

are still present.

He does not think any poisonous action on the foetus need be considered, and moreover claims that his infantile mortality was not greater than the average.

He gives no explanation of the action of the drug beyond its reduction of blood pressure and pulse rate.

100 cases. Total mortality 12%.

Of these 3 were moribund on arrival and received no treatment.

3 already had evidence of cerebral haemorrhage which was subsequently found.

2 died of pneumonia.

His previous mortality (25 years) 23.68%.

Of 91 intra- and antepartum cases, 47 children were living.

Haultain[16] was impressed by the fact that high blood-pressure, more than any other single symptom, was almost constantly present in eclampsia.

He thought it had much to do with the actual seizures and therefore believed that to reduce it by means of veratrum viride was very sound in principle. (He thought that venesection and thyroid owed any success/

success they had to this action).

He had always been impressed by veratrum viride, but pointed out its disadvantages.

He emphasised the superiority of Veratrone.

He thought it was essentially a vaso-depressant, but also possibly a spinal sedative.

He considered it a powerful diuretic.

He thought that possibly there is a specific effect in eclampsia since the action is not nearly so dangerous as in ordinary use.

He states that even if the blood pressure does rise again after having once been lowered he has noted often that the convulsions do not recur.

His method of use is along the same lines:- Small doses, - ½ cc. veratrone, - repeated if necessary, a careful watch being kept on the patient all the time and an aim being made to keep the pulse-rate at about 60.

Some of the Edinburgh school agree with this opinion.

In the discussion subsequent to one of the papers read by Haultain, Prof. McKerrow opposed its use as dangerous.
Jellett and Stephenson thought that it might be an "adjunct" in treatment.

Cragin/

Cragin and Hull[15] expressed a very favourable view and preferred veratrum viride to venesection.

They give it along with chloral and nitroglycerine and are guided by the pulse rate.

Zinke[29] was enthusiastic in praise of veratrone viride. His series of cases is however not a large one to make definite conclusions from.

	Maternal Mortality	Foetal Mortality.
In 26 cases with this method of treatment he had	15.78%	53.88%
In 64 cases prior to this	40%	50%

Edgar stated "Veratrum viride in efficiency stands second only to chloroform. With the pulse strong and rapid it offers the most certain means at our disposal of temporarily, and even permanently, controlling the spasms. Pulse rate is diminished and convulsions are almost unknown when the pulse rate is 60 or under.

Temperature is reduced and the rigidity of the cervical rings is relaxed.

Diaphoresis and diuresis are promptly effected."

He gave m x - x x of the tincture followed by subsequent m x doses. He laid stress, as do others, on the importance of having the patient recumbent.

Hirst/

Hirst mentions its successful use and quotes various small series of cases with mortalities of 23½%, 18% and 11.5%.

Jardine[32] thought very favourably of it, particularly since veratrone had been introduced.

Midwifery, (by Ten Teachers) believes in the effectiveness of the drug but consider that if the patient is feeble there is risk in using it since it has a marked depressing effect on the cardiac muscles.

There is however a strong body of opinion against the use of the drug though not actually expressed by many recent writers.

It is opposed, not on the grounds that it fails to do what is claimed for it, but rather on account of its danger as a cardiac depressant.

Williams states, "The use of veratrum viride, which is highly praised by so many American writers, has never appealed to me upon theoretical grounds, and Sturmers' statistics from the East India Medical Service, where it was used for twenty years, shows a maternal mortality of 45%. After reading the enthusiastic report of Mangiagalli and of Cragin and Hull concerning its merits, I felt that I was perhaps not doing my duty to my patients by/

by rejecting it. Accordingly, in a series of cases I gave it to every other patient, while the alternate patient was treated in identically the same manner except for the veratrum.

While the hypodermic administration of 5 - 10 minims of fluid extract repeated if necessary, undoubtedly leads to a marked slowing of the pulse and occasionally to an almost alarming fall in blood pressure, the patients did neither better nor worse than those who did not receive it. For this reason I have abandoned its use."

This conclusion seems to express well the opinion of all those who do not use veratrone.

Venesection.

Which has been fully considered under a previous heading on account of its eliminating action, is also to be considered from the point of view of its action as an agent whereby the blood pressure is materially lowered.

Morphia.

In addition to its central nervous system sedative effect also has a tendency to lower the blood pressure. This is pointed out by Midwifery by ten Teachers, by Nicholson and by Rouvier.

Nitroglycerine has been suggested for its power as a vaso-dilator but has received little support.

Certain other remedies have from time to time been suggested.

Thyroid extract.

Since its enthusiastic advocacy by Nicholson[33] in 1904 has been tried by many obstetricians.

He recommended it (1) in the pre-eclamptic state as a modifier of metabolic processes which were disordered through deficiency of iodothyrin.
(2) In the seizures. As a powerful vaso-dilator and diuretic agent.

Though mentioned in the majority of text books and writings on treatment of eclampsia and agreed to be probably a vaso-dilator and diuretic agent as Nicholson states, no convincing proof of its special value has been brought forward and most would agree with Williams who states.- "Since other therapeutic measures were employed as well it is difficult to judge of its efficiency".

He himself did not have favourable results.

Lumbar Puncture.

Has been recommended as a more effective way of lowering the intracranial pressure.
Williams refers to Kronig who reported a few successful cases in 1904, but states that Pollock, Henkel, Thies and others who had used it were sceptical of its value.

Gibbons, mentions that Bataski had been successful with this method.

But it has attained no general use and is disregarded by the majority.

Hirudin. (Leech extract)

Hirudin in doses of .2 or .3 gramme was suggested by Engelmann in 1911, who reported success in 12 cases.

It is supposed to inhibit coagulation and thus prevent thrombosis which is regarded by some as an element in the pathology.

Little support of its value has been forthcoming.

The Normal Serum of pregnant women has been suggested as an antitoxin by Mayer. There would seem to be some grounds for considering this theoretically sound, but here also clinical results have not been convincing.

So far the individual medical measures have been discussed. But the various advocates of expectant treatment naturally combine these various remedial agencies in different ways.

A few of the systems of treatment are here outlined as representative.-

Stroganoff who has elaborated the method first advocated by Veit, gives morphia hypodermically in large doses combined with Chloral hydrate (gr. XX : three hourly) per rectum, the latter continued for two or three days.

He is of opinion that neither drug is so efficient when used separately.

He believes in stomach lavage and purgation and gives a minimal amount of chloroform while active measures are being carried out.

He believes in salines in limited quantities.

Venesection he resorts to only when oedema of the lungs is present.

Excitement of all kinds,- physical, psychical and mechanical - must be avoided by placing the patient under perfect conditions of quiet, with the exclusion of all irritant impressions aural or visual.

The greatest attention should be paid to the condition/

condition of the lungs by careful nursing, by posture, and by clearing out the air passages.

The heart also must be carefully watched and cardiac stimulants given if indicated.

Delivery should be ended operatively, provided that it entails no danger to mother or child.

Lichtenstein.

Adopts the Stroganoff routine with the addition of venesection. He is an enthusiastic believer in venesection and is inclined to attribute the greater portion of his success to this measure.

The so-called "Rotunda" system of treatment specially advocated by Tweedy, and agreed in by the majority of the Irish school, is arranged on much the same lines.

Tweedy however bases his treatment on a firm belief that food is the most important causal agent.

He has been impressed by the fact that food of any description, even milk, will cause a recurrence of convulsions.

His theory is that in eclampsia there is an overwhelming of the food antigens of the blood.

In the non-pregnant state these antigens have to cope simply with food particles and are amply sufficient for this purpose.

In/

In pregnancy however these antigens have also to deal with albuminous substances constantly produced by the ovum and liberated in the blood stream.

Normally the antigens are equal to this excessive call.

But if the balance is disturbed particularly by excessive food intake when the foetal products are in considerable quantity, the antigens prove insufficient and convulsions and other eclamptic symptoms result.

In his latest writing on the subject he mentions, as a fact in support of his belief, that in Germany during the war period with its privations, eclampsia was the only disease to show a distinctly lessened incidence.

He therefore withholds all food, even milk, for the first period of treatment.

He places the greatest importance in thorough lavage of stomach and colon.

He controls the fits with Morphia - ½ grain - as a first dose, repeated in ¼ grain doses up to 2 - 3 grains in the 24 hours if required, though the full dosage is rarely necessary.

He avoids chloroform and chloral.

He avoids veratrone and venesection.

He believes in infusions, preferring sodium bicarbonate solution submammary or per rectum.

He does not believe in diuresis.

And having completed active treatment he places the patient under the most favourable circumstances for eliminating all external stimuli.

He only delivers when the os is fully dilated.

He emphasises the importance of becoming skilled in all the smallest details of treatment, in clearing the throat of mucus, in passing the stomach tube and lavaging the colon.

He places importance in attention to posture, the patient being turned frequently from side to side to lessen the tendency to hypostatic congestion of the lungs.

Oxygen should be held in readiness.

Jardine. puts salines first and foremost in his plan of treatment, combining this measure with other eliminative measures.

He believes in the efficacy of the hot pack.

He uses venesection if the patient is full-blooded.

More recently he has expressed a belief in the virtue of veratrone.

He has abandoned morphia as lessening urinary secretion and thus counteracting salines.

For controlling fits he relies on chloroform and chloral.

Ballantyne/

Ballantyne puts his faith in venesection, salines and elimination by stomach and colon lavage, and diaphoresis. He occasionally uses morphia to control convulsions.

Mangiagalli, Zinke and Haultain combine eliminative measures with the exhibition of veratrum viride or veratrone.

II. MEASURES DIRECTED TOWARDS EARLY DELIVERY.

The various methods suggested for evacuation of the uterus are based on the theory, at present widely held, that the toxin is due to the products of conception - either foetus or placenta - and that therefore the primary indication is to remove the cause.

The opponents of early interference do not oppose so much this theory as the methods by which the delivery is effected, maintaining that the additional risks from the interference outweigh the advantages, and that better results are obtained by adopting an expectant policy, strenuously endeavouring to control the convulsions and eliminate the toxin until such time as delivery can be assisted without any shock - provoking operative procedure.

They argue that even though the delivery does remove the source of the toxin, there is already sufficient poison in the body to kill the patient and that therefore elimination should come first and delivery be placed second.

Great stress is laid by some, as an argument in favour of rapid delivery, on the cessation of fits after delivery.

Williams[2] quotes various observers as noting cessation of fits immediately or soon after delivery as follows.-

Duhrssen in 93.75% of cases.
Olshausen in 85% of cases.
Zweifel in 66% of cases.

These estimates appear to be considerably higher than those of many other writers.

Seitz[34] in 2135 operative and spontaneous deliveries 52.7%
Herman[35] in 2042 cases 41%

Petersen[36] in his collected cases gives the following table.-

	Cessation in
In a series of spontaneous deliveries	59.5%
In a series of operative deliveries	59.4%
In a series of vaginal hysterotomies	62.6%
In a series of abdominal Cesarean sections	54.92%

He concludes that the proportion is independent of whether the delivery be spontaneous or operative, or whether previous treatment has been carried out or not.

And the cessation of fits does not mean that the patient is out of danger.

Petersen/

Petersen in his cases noted mortality rates as follows:-

In 407 cases where convulsions ceased after delivery	18.4%
In 271 cases where convulsions continued after delivery	28%

It does not seem to me that these figures afford any very convincing argument in favour of immediate delivery.

Moreover if such importance is laid on the cessation of convulsions, I am inclined to think that equally good figures could be given of cases in which the convulsions were controlled before delivery was completed, under vigorously applied palliative methods.

More convincing are the results which various writers give of their early delivery methods.

These are discussed under the consideration of the various measures and in the comparison of various statistics.

Figures like Freund's[37] 551 cases delivered within 1 hour of the 1st convulsion without a single death, and Petersen's collection of cases from various writers, in which immediate delivery gave an average mortality of 4%, need to be considered.

Another claim brought forward in favour of early interference/

interference is a great saving of foetal life, especially with Abdominal Cesarean section or Vaginal Hysterotomy.

This question will also be referred to under the discussion of these measures.

The arguments against early delivery are:-

(1) The additional risks of such procedures.

(2) The continuance of the convulsions in a large proportion of cases after delivery.

(3) The occurrence of post-partum eclampsia with a mortality which some observers claim to be as high as in antepartum cases. (Lichtenstein 27%)

(4) The occurrence of eclampsia with hydatidiform mole.

(5) The fact that in a large number of cases occurring during pregnancy the convulsions cease and delivery takes place at some considerably later period.

The first consideration in the question of immediate delivery is the condition of labour in which the patient is first seen.

(a) When the cervix is taken up and the external os fully dilated it is agreed by all, whatever opinion they hold, that prompt delivery may certainly be effected by forceps or version. No additional shock is produced, there is no danger of laceration, and with proper care the risk of sepsis should not be increased.

The results are therefore all for the best.

(b) With the cervix completely taken up but the external os not completely dilated if interference is adopted, several courses are available.

(1) Completion of dilation by hydrostatic bags.
(2) Completion of dilation by multiple incisions
(3) Completion of dilation by metal dilators.
(4) Completion of dilation by manual methods.

(Harris)

This is the type of case in which hydrostatic bags are most likely to be of service and Edgar[38] and Eden/

Eden[23] and De Lee[9] suggest their use, though the last-mentioned writer does not speak very highly of them.

They certainly avoid force, but have the disadvantage of being slow in action and a constant source of irritation.

Few at the present time recommend multiple incisions. If the os is so resistant as to require this measure the more complete operation of vaginal hysterotomy would be preferable, and this is discussed in the next section.

Under these circumstances many of the objections raised against accouchement forcé proper (with the cervix uneffaced) are removed.

Bossi's dilators are therefore still used by some in this type of case, and De Lee states that Bossi himself limited the use of his dilator to when these conditions were present.

The majority however condemn it altogether.

Harris' method of manual dilation is advised by most writers, (De Lee) (Williams), and if the case is not likely to yield readily to this, it should rather be discussed along with the more serious type of case in the next section.

C. When the patient is not in labour, or a primipara with uneffaced cervix and a rigid os externum.

It is in this type of case that most discussion arises.

It is here that the advocates of prompt delivery see the greatest necessity for interference.

And it is here that the opponents of these methods see the greatest dangers therefrom.

(1) Manual Dilatation.

At one time very commonly practiced, it is now advised against by the majority even of those who favour prompt interference.

Edgar[7] favouring early delivery skilfully carried out yet "protests against the thoughtless recommendation of this method as being the best, if not the only one, at our command for controlling eclamptic convulsions without giving due consideration to the condition of the cervical barrier."

He points out that there is a definitely constricting influence, under asphyxia, on the body and cervix especially at the internal os. Consequently there will be imminent danger of uterine rupture in any/

any method of rapid manual dilation undertaken before the cervix has at least partially disappeared.

De Lee[9] says that it requires one to three hours, is always associated with laceration, and affords special dangers of sepsis.

Williams[2] says "On the other hand if labour has not set in, no attempt should be made to dilate the rigid cervix ..... I give this advice as I know from my own experience that forcible attempts at accouchement forcé will expose the patient to risks of laceration, haemorrhage, or infection quite as great as those of the underlying disease; and it is far better if the patient is to die, that she succumb to it rather than because of misdirected efforts on the part of the physician."

Strachan[19]. " It is wise to be very chary of sudden dilatation either by hand or by Harris dilators. I have never failed to observe marked post operative shock after these methods, and in one case instantaneous death occurred during the operation."

Fry[39], a champion of early delivery, thinks this method takes time and is productive of laceration.

He/

He thinks the unfavourable results of accouchement forcé are largely due to the aggravation of the disease by the reflex influence of forcible stretching of the cervix.

Instrumental Dilators.

With the introduction of Bossi' s dilators this method was quite extensively used in eclampsia.

But of late years it has been less and less used. Even Bossi himself restricted its use to cases where the cervix was obliterated.

It is open to the same objections as manual dilation and is even more dangerous on account of the rapidity with which dilatation is attained.

In Edinburgh where it was at one time well thought of, its use has been abandoned and this seems to be general.

All recent writings advise against it.

De Lee agrees with Pfannenstiel in saying that in hospital it is superfluous, in private, dangerous.

Multiplication of the evidence against accouchement forcé therefore is unnecessary.

It is rejected by the vast majority even of those who favour early delivery.

If one is guided by the principle of avoiding methods which will reduce the resistance or damage the organs of the patient, accouchement forcé stands condemned.

Slower Methods of Promoting Delivery.

Induction of Labour by Bougies.

The use of Hydrostatic bags.

These methods are not widely recommended for this class of case.

They do not fulfil the indication of rapid delivery for they are slow and uncertain, and they are an added source of irritation.

Bougies might have a place in the induction of labour after the fits had been controlled and when delivery was still regarded as necessary, but not during the seizures.

Rubber bags cannot be used with the cervix undilated.

De Lee in discussing their use gives the following contra-indications. "Scars of the cervix, abnormal rigidity of the cervix, complete closure of the os in a primipara, oedema of the parts, local infection, great urgency."

He also gives a warning against filling the bags too full.

Vaginal/

Vaginal Hysterotomy.

Introduced by Duhrssen, this operation has found great favour amongst many obstetric surgeons - in Germany and America especially.

Petersen and Fry in America have advocated it perhaps most enthusiastically.

They maintain that it best fulfils the indication of early delivery, being quickly performed and substituting clean surgical incisions for the lacerations of other methods.

They also claim greatly reduced maternal and foetal mortalities.

Petersen[36] collecting 530 published and unpublished cases from operators in all parts of the world, analyses them from many points of view.

He first deals with the maternal mortality - average 23.4%.

Among the cases were several fairly large series of operations by the same surgeon, and he gives the following table.

	Number of Cases.	Mortality.
Veit	42	11.9%
Winter	34	8.8%
Poten	24	25%
Stande	40	22.5%

He then attempts to prove by the statistics of various authors that prompt delivery is much more effective than expectant treatment.

He gives the comparative statistics of 7 authors:-

Early Delivery	615 cases	-	15.9% Mortality.
Expectant	390 cases	-	28.9% Mortality.

He gives a further table of cases delivered after the first convulsion - 150 cases with average mortality of 4%.

There is a quickly increasing mortality with the increase in the number of the convulsions and the lapse of time after the first convulsion.

Considering the cessation of convulsions after delivery he found that this occurred in 62.6% of the cases.

The effect of the cessation of fits was as follows:-

Cases in which convulsions stopped	284	-	18.4% Mortality
Cases in which convulsions continued	271	-	28% Mortality.

Foetal Mortality.

He is of opinion that there is an increasing consideration for the child's life in eclampsia/

eclampsia and considers that Vaginal Hysterotomy improves the child's chances.

He gives corrected foetal mortality tables as follows:-

(Excluding all children not viable, or known to be dead on first examination of the patient).

Spontaneous delivery	25.1%
Operative measures (various)	30%
Vaginal Hysterotomy	21.2%
Vaginal Hysterotomy after 3 fits	11.8%

He shows that the child's chances decrease with the continuance of the fits and takes this as an added indication for early delivery.

He shows that the maternal and foetal mortalities are both very much higher if previous attempts at delivery by other means have been made.

He sums up by considering the case for early delivery proved, and stating that "my own personal feeling in the matter is that as far as my own work is concerned Vaginal Hysterotomy will supersede every form of divulsion method."

He goes so far as to say that he would even use it in cases where the cervix was effaced if the os was resistant.

As regards the operation he found that the anterior incision alone was sufficient in the majority of/

of cases, and gave a lower mortality than the combined anterior and posterior incisions (17.2% and 21.9%)

The frequency of tears was also less than with the combined incision.

Forceps delivery after the hysterotomy gave a lower maternal and a higher foetal mortality than version.

He gives a very optimistic opinion regarding the difficulties of the operation.

In 214 cases no difficulties were encountered.

In 263 cases no statement was made on this point by the operators.

The main difficulties were with the bladder, and in drawing down the cervix.

Fry[39] is an equally emphatic advocate of the method of delivery. He considers that the rapid emptying of the uterus is indicated, that methods of accouchement forcé are out of the question, that Abdominal Cesarean section gives too high a mortality to be justified and that therefore the only method of quickly dilating an intact unprepared cervix without subjecting the patient to the injurious influences of forced mechanical stretching is Vaginal Hysterotomy.

He does not advocate its use by the general practitioner.

In British Journals and works on Obstetrics though no large statistics have been given, various writers have favoured the operation. Strachan[19], Purslow[17], Haultain[16].

On the other hand considerable objection has been raised against the operation both in America and in this country.

McPherson[27] in America says "it is an operation which requires considerable technical skill and while it has a distinct place in obstetric surgery, the wholesale use of it which is being recommended at present is in my opinion entirely unwarrantable."

"Any operation which offers the risks of puncturing the bladder and rectum - and I have seen this done by competent operators - the dangers of haemorrhage and the difficulties of suture that this one does is not lightly to be undertaken except in the hands of an experienced vaginal operator under exceptional circumstances and even he at times may meet with great difficulties."

Gibbons[11] thinks that in vaginal hysterotomy "the difficulties which may be met with are principally connected with injury to the bladder, difficulty in drawing down the cervix and/

and in suturing it, and in tearing the cervix.

"Taking into consideration that in Duhrssen's operation the parts operated on are high up and that one must often trust to touch because everything is not in sight, that haemorrhage may tend to obscure the field of operation, and that when finally forceps or version are used, with the knowledge that injury may be done to bladder or uterus, I think that most will prefer the abdominal route."

Hellier[40] of Leeds in remarks on a successfully treated case of eclampsia by Cesarean section, mentions that he did not desire to attempt vaginal hysterotomy as he had recently seen it performed on the Continent and was much struck by the serious amount of trauma involved.

Fry would overcome all these objections on the grounds of faults in technique but one has no reason to doubt the experience of these other operators.

Williams would restrict the use of vaginal hysterotomy to multiparae whose outlets were relaxed and whose vaginae were capacious.

De Lee would perform it before the 34th week of pregnancy, and thinks rigidity of the pelvic floor is one of the strongest contraindications.

Munro Kerr[41] thinks it is the best way of emptying the uterus up to the 25th week.

Shock is lessened and repeated anaesthesia done away with.

It has the disadvantage of being unsuited for general practice as special skill and two assistants are required.

In the later weeks of pregnancy he is "not convinced that Vaginal Hysterotomy is suitable or so sound in principle as operating by the abdominal route."

The writers of Midwifery by Ten Teachers[6] would restrict the use of the operation to before the 25th week and to cases in which the vagina is roomy.

Similar indications guide those in Edinburgh who favour the operation.

Brodhead[42] collected 125 cases with a mortality of 19.5%. He believes that vaginal hysterotomy in good hands gives the best results but confesses to a feeling of disappointment for he feels that with prompt operation the mortality should be lower.

Carstens[43] Would limit the operation to cases before 7 months where fits are frequent.

Abdominal Cesarean Section.

Suggested by Halbertsma in 1878, the practice of abdominal Cesarean section in eclampsia has not been extensively carried out until recently.

As the operative technique has become perfected, more and more favourable reports are being received regarding Cesarean section in the type of case here considered.

At first resorted to only when there was some complication which in itself was an indication, many now advocate it for eclampsia per se.

In 1911 Fry quoted Charpentier as estimating the mortality at 36.26%, Hillman at 50% and Olshausen at 33.3%.

Petersen[44] in 1914 from the collected statistics of 500 cases performed by 289 operators all over the world, made a thorough investigation of the status of the operation at that time.

He showed that while the mortality in 198 cases prior to 1908 was 47.97%, this gave quite an erroneous idea of the worth of the operation at the present day.

He pointed out that the operation itself had only been on a sound foundation within very recent years.

In/

In 283 cases performed since 1908 the mortality was 25.79%.

He showed 45 cases performed by 5 operators, with a mortality of 9.5%, and 60 cases performed early (after 1 - 5 convulsions) with a mortality of 13.33%.

He was of opinion that the mortality could be still greatly lowered by earlier operation.

Though not advocating abdominal Cesarean section in every antepartum case, he thought these figures meant that we must revise our opinion of its place in eclampsia treatment.

He thought that even these figures compared very favourably with the average in antepartum eclampsia which is admittedly high.

With regard to foetal mortality, he gives very striking figures.

Since 1908 in 235 cases in which the child was viable the mortality was 3.4%, and when operation was performed after 1 - 5 convulsions (118 cases) the mortality was 2.8%.

The convulsions ceased in 54.92% of cases and those where they ceased the mortality was 19.8% as compared with a general mortality of 25.79%.

De Lee[9] thought that the operation had not obtained the recognition it deserved. He believed that it was "preferable to Vaginal Hysterotomy/

Hysterotomy when there was contracted pelvis, placenta praevia, great oedema, unusual brittleness of the cervix, varicosities, large child or abnormal presentation."

He thought that nitrous oxide and oxygen anaesthesia overcame the greatest danger.

"Given a primipara at or near term with a long closed cervix and a living child, the patient in a good maternity, I would strongly incline to Cesarean section."

In his more recent "Obstetrics" he continues to advise it strongly.

Cragin and Hull[15] thought that it might prove the operation of choice.

Carstens[43] recommended Cesarean in severe cases near term.

Edgar[38] - recommended it in primiparae with long undilated cervices.

Williams - recommends it in primiparae with rigid outlets and undilated cervices especially in the presence of any other condition which in itself would be an indication.

In/

In recent writings in Great Britain McCann[45] advised it under the following conditions.-

When the fits are severe and recur in rapid succession.

When labour has not commenced.

When the cervix is difficult to dilate from elongation, hypertrophy, etc.

When the mother is moribund and the foetus alive and viable.

When labour has commenced and there is disproportion between child and pelvis.

When surroundings are suitable.

One must have the courage to decide promptly.

Gibbons[11] was of the opinion that "supposing the surroundings be suitable and arrangements satisfactory, and patients near term Abdominal Cesarean section is easier (than Vaginal Hysterotomy) and provides a clear exit for the child especially if there be the least contraction.

This is probably more true to-day than when Duhrssen's operation was originally introduced because the field of Cesarean section has been extended."

Sharp[26] of Bradford while advocating an expectant plan chiefly, recommended Cesarean section if the os was rigid.

Hellier[40] while not advocating it as a routine remarked on a successful case (in a primipara with rigid cervix) and considered that abdominal Cesarean section was the quickest way of emptying the uterus when labour had not commenced, that it caused wonderfully little shock and no trauma.

Purslow[17] was inclined to Cesarean section as the most satisfactory method of early delivery.

White[46] advocated Cesarean section in primiparae with cervix undilated, especially if urine was scanty and generalised oedema or cyanosis present.

He thought there was no method of rapid delivery per vaginam except at the cost of local trauma and shock that exceeded that of laparatomy.

And in this class of case he considered salines and morphia contraindicated.

Smith[20] was strongly in favour of Cesarean section in this class of case.

Midwifery by Ten Teachers[6] recommends Cesarean section.

Munro Kerr[41] while strongly opposed to operative measures until saline transfusion and the administration of chloral and morphia have been given a full trial, thinks however that/

that if this fails and the seizures are of great frequency and severity, the patient in the later months of pregnancy, and the cervix not taken up, Cesarean section is not only justifiable but absolutely indicated.

A Comparison of some of the Statistics Published.

Though apt to be very misleading especially when published to support one particular point of view, a comparison of the best results obtained by various methods would seem more reasonable and instructive.

(1) Those supporting conservative treatment have given results as follows:-

	No. of Cases.	Mortality.
Veit.	60	3.3%
Stroganoff (1897-1910)	400	6.6%
Stroganoff (from his own and other cliniques up to 1912)	839	8.9%
Roth.	50	8%
Tweedy (over 7 years)	74	8.11%
Lichtentstein (1910-1915)	94	5.3%
Knipe and Connolly.	83	16.8%
Mangiagalli.	100	12%

These are consecutive series in which the total mortality is given without corrections.

2./

(2) Those advocating early delivery:-

	Early delivery.		Conservative.	
	No.	Mortality	No.	Mortality.
Zweifel		11.25%		28.5%
Seitz		6.5%		28.5%
Bumm	330	17.7%		
Petersen (collected)	615	15.9%	390	28.9%
Beckmann	96	18%	210	32.9%

(3) In selected cases where delivery was performed within one hour or after 1 - 3 convulsions:-

Freund reported 551 cases - mortality 0%

Petersen (collected) 150 cases mortality 4%

(4) Vaginal Hysterotomy.

	Cases.	Average Mortality %.	Early delivery%
Petersen	530 (collected)	23.4%	
Brodhead	125 (collected)	19.5%	

(5) Abdominal Cesarean Section.

Petersen	283 (collected since 1908)	25.79	13.33%

III. EDINBURGH ROYAL MATERNITY HOSPITAL CASES.

Period 1890 - 1899.

Number of Cases.	Deaths.	Mortality %.
45	21	46.6%

Post partum cases 8

Twins 2 cases

Total deliveries in the 10 years - 3198.

Period 1900 - 1909.

	125	43	34.4%
Antepartum	53	14	
Intra-partum	40	15	
Post-partum	17	5	
Unrecorded (before delivery)	12	8	

Twins 3 cases

Total deliveries in the 10 years - 4129.

Period 1910 - 1919.

	234	57	24.36%
Antepartum	75	27	
Intrapartum	102	17	
Post Partum	48	8	
Unrecorded (before delivery)	9	5	

Twins 10 cases

Total deliveries for the 10 years - 6881.

Cases in which the patient was delivered by various measures.

Period 1900 - 1909.

	No. of Cases.	Deaths.
Forceps	7	2
Manual Dilatation (& Forceps or version)	18	12
Induction	3	1
Dilatation with Bossi's dilator	16	10
Cesarean Section	1	1
Vaginal Hysterotomy	2	2
Total.	47	28

Period 1910 - 1919.

Forceps	9	4
Manual dilatation & Forceps or version	18	7
Induction	2	1
Bossi	3	2
Cesarean Section	2	1
Vaginal Hysterotomy	3	3
Total.	37	18

84 cases with 46 deaths.

54.7%

In the same periods 230 cases were treated by medical measures with 54 deaths 23.5%.

Deductions from the Edinburgh Statistics.

1. That there has been a very marked decrease in the mortality in the 3 decades.

In part this is undoubtedly due to the fact that doctors now send the majority of eclamptic patients to hospital and not merely the very bad ones as often happened formerly when the Maternity Hospital was held in some disrepute by the public.

In part, too, it is due to earlier admission - a very satisfactory feature, and a point of importance on which too much emphasis cannot be laid.

But on the whole the two periods - 1900 - 1909 and 1910 - 1919 - afford a fair comparison of the results of treatment.

The incidence of eclampsia cases per total number of deliveries was very much the same (1 in 330 and 1 in 294 respectively) and the conditions under which patients were received were comparable.

The cases in the series were in the main treated by expectant methods, by accouchement forcé, or by a combination of the two.

These measures alone therefore are reviewed. No deductions as to the value of Cesarean section or Vaginal Hysterotomy can be made.
Abdominal Cesarean Section was performed on only three occasions in the last 20 years and two of the cases were fatal. But both of these were operated on late.

Similarly/

Similarly vaginal hysterotomy was performed 5 times with 5 deaths, but again the operation would appear to have been done as a last resort.

All that one gathers from this is further evidence of the high mortality which is associated with these operations when performed late.

What were the results of interference in these cases?

In the two decades 84 cases were delivered by various means, with 46 deaths - a mortality of 54.7%.

Granted that some cases were treated late, after failure of other methods, yet there were many in which the operative procedure was the first and chief agent, and in quite a number of the cases the convulsions had been but few in number.

The results obtained with Bossi's dilators are very interesting. The instrument was being used with the enthusiasm for a new method of treatment by some. Yet what was the result?

19 cases were so treated with 12 deaths.

It is significant that while used in 16 cases in the earlier decade, the method was resorted to only 3 times after 1909 - showing that the attitude of Edinburgh obstetricians towards this instrument, after experience, was the same as that of the majority elsewhere - one of avoidance.

Forceps/

Forceps or version after manual dilatation of the cervix was recorded as the chief agent in treatment in 52 cases.

Included in this number are some where the reports are scanty, but where one gathers that little dilatation was required.

Yet in the 52 cases there were 25 deaths.

In the same periods expectant treatment in 183 antepartum and intrapartum cases gave a mortality of 22.4%.

Comparing the two decades:-

1900 - 1909. In 125 cases surgical measures were used in 47 cases.

1910 - 1919. In 234 cases surgical measures were used in 37.

And along with this less frequent use of forcible measures of delivery the general mortality fell from 34.4% to 24.36%.

The analysis shows that in Edinburgh the improvement as regards treatment has been entirely along expectant lines, with a less frequent resort to forcible measures.

It certainly adds convincingly to the accumulated evidence against all forms of accouchement forcé.

Proceeding/

Proceeding further:- can one arrive at any conclusions as to what particular elements in the medical treatment were specially successful?
Elimination was along much the same general lines in all the cases.
Purgation and enemas.
Stomach lavage has been used extensively since 1909.
Diaphoresis has been almost constantly used, for the most part in moderation, either by means of the hot pack or simply with blankets, hot bottles, and water-proof sheet.
Salines have been used by the majority of the chiefs, though not all.
Venesection has been regarded favourably though veratrone has replaced it in the hands of some.

The results from these measures alone are compared with those obtained when morphia or veratrone were used as adjuncts:-

(See Table over)

Cases Treated by Expectant Measures.

1900 - 1909.

	Antepartum or Intrapartum.		Post partum.		Total.	
	Number	Deaths.	Number.	Deaths.	Number.	Deaths.
Eliminative Measures alone	15	0	13	2	28	2
Morphia	32	4	4	3	36	7
Veratrone	0	0	0	0	0	0
(Unrecorded)	7	6			7	6
1910 - 1919.						
Eliminative Measures alone.	32	13	23	3	55	3
Morphia	36	7	13	2	49	9
Veratrone	38	5	9	2	47	7
Morphia and Veratrone	12	2	3	1	15	3
(Unrecorded)	11	4	-	-	11	4

Morphia. was used along with eliminative treatment in 68 Intra- and Antepartum cases with 11 deaths. 16.2%.

In 17 Post partum cases with 5 deaths.

Cases are excluded where the morphia was given in conjunction with forcible delivery, for though in a few cases such treatment was adopted because the morphia had failed to control the convulsions, in as many no fair trial of the morphia was given.

Veratrone. was used along with eliminative treatment as follows.-

Antepartum and Intrapartum	38 cases with	5 deaths.
Post partum	9 cases with	2 "

Morphia combined with Veratrone.

Antepartum and Intrapartum	12 cases	2 deaths.
Post partum	3 cases	1 death.

Elimination Solely.

Antepartum and Intrapartum	47 cases	13 deaths 27.6%
Post partum	36 cases	5 deaths.

It would seem that Morphia has proved a very efficient adjunct to eliminative treatment.

True, the brilliant results obtained by Stroganoff, Lichtenstein/

Lichtenstein and Tweedy have not been attained, but the reading of the cases gives one the impression that in some the details of treatment were not carried out so minutely as these authors advise.

And one feels that with attention to all these details and prompt carrying out of the manipulative part of the treatment the figures might be considerably improved.

Moreover it is generally recognised that owing to climatic conditions eclampsia occurs in a specially severe form in Scotland. And many of the cases come from outlying districts after a long journey by ambulance.

Still the results compare quite favourably with the general average from similar hospitals receiving cases under similar conditions.

With regard to veratrone there is no doubt that in Edinburgh the results have been encouraging.

Foetal Mortality.

1900 - 1909.

In 123 cases in which particulars are given there were 83 deaths:- an uncorrected mortality of 67.5%.

If however only viable children are considered:-

25 were dead

40 living

65 A mortality of 38.5%

1910 - 1919.

Out of 231 children, 117 were dead

an uncorrected mortality of 50.67%

Considering only viable children:-

44 were dead

114 alive

158

A corrected mortality of 28%

All children are included who died before the mother left hospital.

These figures therefore show a 10% improvement of the mortality rate for viable children, under improved medical treatment.

The figures agree fairly with those of Petersen and others.

For spontaneous delivery he gave 25.1%

For operative measures (various) 30%

Other points of interest brought out by this study but bearing less directly on treatment.

Incidence of Ante- , Intra- , and Post Partum cases in the series:-

	Number.	Percentage.	Mortality.
Antepartum	128	38.5%	32.03%
Intra-Partum	142	43.5%	19.01%
Post-Partum	65	18%	20%

Incidence per total number of deliveries.

359 eclampsia cases in 11,010 deliveries.

An average of 1 case in 30 deliveries.

Incidence of Twins.

13 times in 369 eclampsia cases.

1 in 27½.

Incidence of Primiparae:-

75.2%

Period of Pregnancy.

At or near term	65%
Premature	35%

Convulsions in the Child were noted in 4 cases.

Previous eclampsia in the Mother was noted in 2 cases.

Pneumonia occurred in 11 cases.

IV. C O N C L U S I O N S.

1. That after prophylactic treatment, the most important step is to institute treatment, whether medical or surgical, as soon as possible.

The number of convlusions though not an absolute indication, yet being a fair guide as to the severity of the case.

2. That when the os is fully dilated there is no question that hastening delivery by forceps is the best treatment. It entails no additional risks from shock or prolonged anaesthesia, and the results are all for the best.

3. That when the cervix is obliterated but the os not fully dilated, manual dilatation by Harris' method will in many cases bring about the desired result speedily and quite safely.

But if undue resistance is encountered it is wisest to desist at once and rely on expectant measures.

4. That from the showing of the Edinburgh cases and from a review of the general opinion of numerous writers, accouchement forcé either by manual dilatation or by Bossi's dilators, stands condemned.

5./

5. That slow methods of induction of labour by hydrostatic bags or by bougies are not serviceable.

But that they have a place in treatment when convulsions have ceased and when it is considered advisable to complete the labour.

6. That the problem would therefore seem to be reduced to a consideration of the merits of expectant treatment as against.- (1) Vaginal Hysterotomy, (2) Abdominal Cesarean Section, and in those cases in which labour has not commenced, or where the cervix is not taken up and rigid.

A further consideration has to be made according to whether the patient is under the care of a general practitioner, or in hospital, or within easy access of hospital.

7. That Vaginal Hysterotomy is an operation admittedly difficult to perform especially near term, which in competent hands has given an average mortality of 23.4%, but which in selected cases where operation has been performed within a very short period after the onset of convulsions, has given the low mortality of 4%.

These last figures are very striking but it must be remembered that but few patients reach the average Maternity Hospital under such favourable/

favourable circumstances.

And it is admitted that the maternal mortality becomes rapidly worse with the lapse of time between first convulsion and operation.

As regards controlling the convulsions the proportion of cases where convulsions continued after delivery was much the same as with any other method of treatment.

And even in the cases where convulsions ceased the mortality was still 18%.

Foetal mortalities are difficult to compare owing to the different corrections made by various authors.

But the average figure given for Vaginal Hysterotomy by Petersen (21.2%) has been equalled or bettered under expectant treatment in many cases.

The most that can be said is that Vaginal Hysterotomy under specially favourable circumstances (after but 3 convulsions) has given a considerably better result than the average (11.5%).

8. That in Abdominal Cesarean Section we have the least shock-provoking and the most rapid method of delivery, and the one which undoubtedly gives the smallest foetal mortality.

It/

It has given an average maternal mortality of 25% in a collection of cases performed between 1908 and 1913, and there is every indication that with further improvement in the technique of the operation this will be considerably lessened.

The conclusion one comes to is that it is being regarded with great favour by an increasing number of obstetricians and that of operative measures it now holds first place in the particular class of case under discussion, particularly in primiparae near term.

9. That compared with these results from Vaginal Hysterotomy and Abdominal Cesarean Section we have purely expectant treatment in the hands of Lichtenstein, Stroganoff and Tweedy giving mortality figures of 5.3%, 6.6% and 8.11%.

And in the hands of many others though not so strikingly successful, it has given very satisfactory results.

Granted that the figures would be somewhat higher in the antepartum class of case in which Cesarean section would be indicated, yet these results cannot be passed over lightly.

To my mind these results from series of consecutive/

consecutive cases are far more impressive than the selected statistics which are chiefly put forward to support the claims of Vaginal Hysterotomy and Cesarean Section.

Agreeing with the principle of immediate delivery in its entirety, the logical conclusion would be that one must operate on the majority of antepartum cases and a number of intrapartum cases at the very first opportunity.

For the great majority present the conditions of primiparity, tight outlet and rigid cervix.

And accepting Cesarean Section as the best surgical measure in primiparae when the pregnancy is beyond the 25th week, this would mean its use in certainly half the antepartum cases.

In face of the undoubtedly good results which have been obtained by expectant methods, I am very doubtful whether such a course would be justifiable or wise.

The statistics so far published have been collections of small series of cases.

If a true and fair comparison is to be made with expectant treatment, the results of a sufficiently long consecutive series of antepartum cases all treated by Cesarean Section on admission must be awaited.

That/

That collected cases operated on within a very short period of the onset of convulsions have given such satisfactory results is of great importance.

But such results cannot be compared fairly with those obtained by other methods in cases seen early or late.

A similar selection of those cases brought under medical treatment very early would also show greatly reduced mortality figures.

It must be admitted that in a restless, toxic, eclamptic patient, the operation in itself is not so comparatively harmless as it is under other circumstances.

And the after-condition of the patient must be considered.

The majority of them have normal pelves and can be expected to have spontaneous deliveries in future pregnancies.

The fact that 70 cases of rupture of the scar of a Cesarean section during a subsequent labour were collected in 1918, would make one hesitate to perform the operation unnecessarily.

A/

A less extreme view is that Cesarean section has its place in the treatment of eclampsia, antepartum, but that there must be careful selection.

Some would limit the operation to "severe" cases. But the difficulty is to determine the severe cases from a first examination.

It is agreed by all that undue delay is dangerous.

But while deprecating delay and not advocating Cesarean section as a late last resort, I am of opinion that it is along the lines of careful selection that the proper sphere for Cesarean Section will be found.

70% of the antepartum cases in this series recovered, and others with purely expectant treatment have had considerably better results than this.

Can one decide quickly what cases are going to react to eliminative and sedative treatment?
Anyone who has treated eclamptic cases by a vigorous eliminative and sedative method must have been struck by the fact that a very large number of the cases have not had a single convulsion after treatment.

It is safe to say that the majority of cases which are going to respond to this treatment will give an indication of this by immediate or early cessation of convulsions.

And/

And most of these cases end in recovery. Conversely in the cases which end fatally the majority show continuance of the convulsion after the treatment has been instituted.

This, of course, is by no means an absolute differentiation, for there are some cases without convulsions yet deeply comatose, and others in which a fatal result occurs from a complication such as broncho-pneumonia

Still it is a useful one.

Here, then, appears to be one help in the selection of cases which call for operative interference.

(a) If the case does not respond to vigorously applied expectant treatment by cessation of convulsions within 2 hours from the commencement of treatment (a time limit suggested by Munro Kerr) then perform Cesarean section.

Preparations should in the meantime be made for the operation, and since these preparations in themselves take some little time even in the most modern lying-in hospital, this short delay will be practically even less than it appears.

Moreover, the advocates of early delivery agree that elimination of all the toxins already present is necessary after delivery.

The/

The institution of this treatment prior to the operation, even at the expense of slight delay, will have the advantage that no further interference with the patient after operation will be necessary, and it will be possible at once to place her under those conditions of withdrawal from all irritating external stimuli which are agreed to be such an effective adjunct in treatment.

It is true that De Lee objects to the giving of purgatives before delivery lest the seat of operation be fouled, but it is not common experience for purges to act so promptly and the disadvantage applies more particularly when the operation is vaginal.

And no one can object to stomach and colon lavage.

(b) Further, if though the convulsions do not recur the coma deepens with no improvement in the general condition of the patient, with cyanosis, with persistent high blood-pressure, or with anuria, operation should be resorted to.

(c) Though the life of the child is quite a secondary consideration and these measures are discussed from the point of view of the Mother's welfare chiefly, I would be inclined to extend the sphere of the operation still further in cases where the child was certainly viable and living.

In/

In these cases unless obviously mild, Cesarean Section might be justifiable without any period of testing.

And always the operation is advised provided only that the ordinary requirements for Cesarean Section are fulfilled:-

the patient in good surroundings,

the patient clean and not already subjected to much handling.

One feels that along such selective lines the best all-round treatment will be obtained.

It will eliminate unnecessary operation in many cases and yet will give the severe cases the chance of operation in reasonable time if other measures fail.

Undoubtedly it will make the statistics for the operation higher than the best results published, but this will be because of the exclusion of the milder cases which did not require the operation, and which were certainly better without it.

And it is the welfare of the patient and not the statistics of a particular operation which we are aiming at improving.

Regarding the individual measures considered under medical treatment, what conclusions does one arrive at?

(1) That elimination by the bowel, purgation, enemas, and colon lavage is sound and wise.

(2) That stomach lavage is of great value.

(3) That salines have been proved of great service as a diluent to the toxins and as a diuretic agent.

That perhaps rectal salines are as useful as any.

(4) That diaphoresis by hot pack and vapour bath has the bulk of clinical experience in its favour.

(5) That venesection is a measure whose re-introduction has undoubtedly been justified.

(6) That veratrone though undoubtedly producing the immediate effects claimed for it in reducing blood pressure and pulse-rate, is a drug not without considerable danger and the bulk of opinion is against its use.

The results in Edinburgh have however certainly been satisfactory.

(7) That the great favour in which morphia is held in all parts of the world and the results from its/

its use combined with eliminative measures, justify the belief that it is the drug to be used as a sedative.

(8) That withdrawal from all sources of irritation is an important aid.

(9) That the bulk of opinion finds little use in chloral except combined with morphia, and that it is further opposed on account of its supposed poisoning action.

(10) That thyroid extract and leech extract have not been proved to have any considerable effect apart from the measures with which they are combined.

Briefly then the treatment advocated is as follows:-

A dependence chiefly on expectant treatment with operative delivery under certain definite conditions:-

(1) In general practice.

Eliminative treatment and sedatives (Morphia) under all circumstances until safe delivery is possible.

(2) In Hospital practice.

(a) Cervix effaced and os dilated or easily delatable.

Delivery/

Delivery by forceps (or version) followed by eliminative and sedative treatment.

(b) Patient not in labour or cervix long and rigid. Eliminative and sedative treatment instituted at once, and if this fails to bring about improvement within 2 hours, operative treatment by:-

Vaginal Hysterotomy if the pregnancy is not beyond the 25th week, or if, in a multipara, with a roomy vagina, there appears to be no disproportion between head and passages.

or Cesarean Section under all other conditions.

REFERENCES.

1. Lichtenstein, reviewed in "Journal of Obstetrics and Gynaecology of the British Empire" 1913. p. 192.

2. Williams' "Obstetrics".

3. Jardine's "Obstetrics".

4. Hirst's "Obstetrics."

5. Petersen's "Obstetrics".

6. Midwifery (by Ten Teachers)

7. Edgar, "Practice of Obstetrics".

8. Tweedy & Wrench. "Practical Obstetrics".
   B.M.J. 1911. p.990.
   B.M.J. 1918.

9. De Lee's Obstetrics, and Journal of Americam Medical Association, Vol. LVI. 1911.

10. Ballantyne. "Journal of Obstetrics and Gynecology of the British Empire" 1910. p.383.

11. Gibbons. B.M.J. 1913. p.865.

12. Stroganoff, reviewed in appendix of Tweedy & Wrench's Practical Obstetrics.

13. Winter)
(reviewed in Journal of American
14. Werner) Medical Association 1916.
Vol. LXVI, p. 229 and 313.

15. Cragin & Hull. Journal of American Medical Association. 1911. Vol. LVI.

16. Haultain. Journal of Obstetrics and Gynecology of British Empire 1913. B.M.J. 1914, p. 537.

17. Purslow. Lancet. 1915.

18. Knipe & Connolly. American Journal of Obstetrics. II. 63. 1916.

19. Strachan. Lancet 1917. p. 421.

20. Smith. B.M.J. 1919. (July)

21. Burney Yeo. "Manual of Medical Treatment".

22. Little. Journal of Obstetrics and Gynecology of British Empire. 1909, p.145.

23. Eden's Midwifery.

24. Johnstone's "Text Book of Midwifery".

25. Galabin.

26. Sharp. B.M.J. 1913. I. 504.

27. McPherson American Journal of Obstetrics 1918. Jan. p. 58.

28. Rouvier reviewed in Journal of American Medical Association, p.514. 1914.

29. Zinke. American Journal of Obstetrics 1911.

30. Brodhead. American Journal of Obstetrics 1914.

31. Mangiagalli. B.M.J. 1908.

32. Jardine. B.M.J. 1914, p.141.

33. Nicholson. "Journal of Obstetrics and Gynecology of the British Empire" 1904. pp. 32 - 37.

34. Seitz, quoted by Petersen in American Journal of Obstetrics.

35. Herman, quoted by Gibbons. B.M.J. 1913.

36. Petersen. American Journal of Obstetrics, 1911.

37. Freund, quoted by Gibbons. B.M.J. 1913.

38. Edgar. Journal of American Medical Association, Vol. 70. 1918.

39. Fry. Journal of American Medical Association. 1911.

40. Hellier. B.M.J. 1913. p. 1109.

41. Munro Kerr.

42. Brodhead. American Journal of Obstetrics 1917.

43. Carstens. Journal of American Medical Association 1914. p. 1878.

44. Petersen. American Journal of Obstetrics, 1914.

45. McCann B.M.J. 1918.

46. White. B.M.J. 1918.